CLAIMS

1. A gyroscope comprising a pair of constituent gyroscopes, each of the constituent gyroscopes comprising:

a proof mass;

a frame supporting the proof mass;

a connection arrangement connecting the proof mass and the frame, the connection arrangement having a first stiffness in a first direction and a second stiffness in the second direction substantially perpendicular to the first direction, one of the stiffnesses being significantly greater than the other stiffness; and

a pair of elements, one of which is a quantum tunnelling sensing tip, adapted to sense motion therebetween in either the first or the second direction.

2. A gyroscope according to Claim 1, wherein means are provided on each of the constituent gyroscopes to cause the respective proof masses to oscillate in either the first or the second direction, the pairs of elements being adapted to sense motion in the other of the first or the second direction.

3. A gyroscope according to Claim 1, wherein the means to cause the respective proof masses to oscillate are operable to cause the respective proof masses to oscillate in antiphase with one another.

4. A gyroscope according to Claim 2 or 3, wherein at least one of the means to cause the proof masses to oscillate comprises at least one electrostatic oscillation actuator.

5. A gyroscope according to Claim 2 or 3, wherein at least one of the means to cause the proof masses to oscillate comprises at least one current-

carrying element orientated in the other of the first or the second direction, a magnetic field being provided in a direction perpendicular to the first and second directions.

6. A gyroscope according to any preceding claim, wherein at least one of the connection arrangements comprises at least one suspension beam extending between the proof mass and the frame.

7. A gyroscope according to any preceding claim, wherein at least one of the constituent gyroscopes comprises an anchor, the frame of the constituent gyroscope being connected to the anchor.

8. A gyroscope according to Claim 7, further comprising a positioner located adjacent the frame of the at least one constituent gyroscope, the positioner being connected to the anchor.

9. A gyroscope according to Claim 8, wherein the positioner is connected to the anchor by at least one spring.

10. A gyroscope according to Claim 8 or 9, further comprising means to vary the distance between the positioner and the frame.

11. A gyroscope according to Claim 10, wherein the means to vary the distance between the positioner and the frame comprise at least one electrostatic positioning actuator.

12. A gyroscope according to Claim 10, wherein the means to vary the distance between the positioner and the frame comprise at least one current-carrying element.

13. A gyroscope according to any preceding claim, wherein one of at least one of the pairs of elements is located on the frame of the respective constituent gyroscope, the other of the at least one of the pairs of elements being located on the proof mass of the respective constituent gyroscope.

14. A gyroscope according to any one of Claims 8 to 12, wherein one of the pair of elements on the at least one constituent gyroscope is located on the positioner, the other of the pair of elements being located on the frame of the at least one constituent gyroscope.

15. A gyroscope according to any preceding claim, wherein at least one of the constituent gyroscopes comprises a further proof mass.

16. A gyroscope according to Claim 15, wherein the at least one constituent gyroscope comprising a further proof mass further comprises a strut passing between the proof mass and the further proof mass of the respective constituent gyroscope.

17. A gyroscope according to any preceding claim, wherein the sensed relative motion between each of the pairs of elements is used to maintain a predetermined distance between the elements of each pair of elements.

18. A gyroscope according to any preceding claim, wherein the respective pairs of elements are adapted to sense motion in collinear directions.

19. A gyroscope comprising:

a proof mass;

a frame supporting the proof mass and connected to only one edge thereof by a connection arrangement extending between the proof mass and the frame in a first direction, the connection arrangement having a first stiffness in the first direction and a second stiffness in a second direction substantially perpendicular to the first direction, the first stiffness being significantly greater than the second stiffness; and

a pair of elements adapted to sense relative motion therebetween in the first direction.

20. A gyroscope according to Claim 19, further comprising means to cause the proof mass to oscillate in the second direction.

21. A gyroscope according to Claim 20, wherein the means to cause the proof mass to oscillate comprise at least one electrostatic oscillation actuator.

22. A gyroscope according to Claim 20, wherein the means to cause the proof mass to oscillate comprise at least one current carrying element oriented in the first direction.

23. A gyroscope according to any one of Claims 20 to 22, wherein the frame and the proof mass are connected to one another by the connection arrangement such that, during oscillation of the proof mass in the second direction, the proof mass suffers an angular deflection with respect to the frame.

24. A gyroscope according to Claim 23, wherein the proof mass suffers the angular deflection as a result of a cantilever effect.

25. A gyroscope according to any one of Claims 19 to 24, wherein one of the pair of elements comprises a quantum tunnelling sensing tip, the other of the pair of elements comprising an electrode.

26. A gyroscope according to any one of Claims 19 to 25, further comprising a positioner located adjacent the frame.

27. A gyroscope according to Claim 26, further comprising an anchor, the positioner and the frame being connected to the anchor.

28. A gyroscope according to Claim 27, wherein the positioner is connected to the anchor by at least one spring.

29. A gyroscope according to Claim 27 or 28, wherein means are provided to vary the distance between the positioner and the frame.

30. A gyroscope according to Claim 29, wherein the means to vary the distance between the positioner and the frame comprise at least one electrostatic positioning actuator.

31. A gyroscope according to Claim 29, wherein the means to vary the distance between the positioner and the frame comprise at least one current-carrying element oriented in the second direction, a magnetic field being provided in a direction perpendicular to the first and second directions.

32. A gyroscope according to any one of Claims 26 to 31, wherein one of the pairs of elements is located on the positioner, the other of the pair of elements being located on the frame.

33. A gyroscope according to any one of Claims 19 to 25, wherein one of the pair of elements is located on the frame, the other of the pair of elements being located on the proof mass.

34. A gyroscope according to Claim 33, further comprising an anchor, the frame being connected to the anchor.

35. A gyroscope according to Claim 34, wherein the frame is connected to the anchor at only one end thereof.

36. A gyroscope according to any one of Claims 29 to 32, wherein the one of the pair of elements that is located on the frame is located near the end of the anchor which is not connected to the anchor.

37. A gyroscope according to any one of Claims 19 to 36, wherein the sensed relative motion between the pair of elements is used to maintain a predetermined distance between the pair of elements.

38. A gyroscope comprising two gyroscopes according to any one of Claims 19 to 37, adjacent one another such that the respective pairs of elements are adapted to sense motion in collinear directions.

39. A gyroscope according to Claim 38, wherein the collinear directions are opposite collinear directions.

40. A gyroscope substantially as hereinbefore described, with reference to the accompanying drawings.

41. Any novel feature or combination of features disclosed herein.